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Exploratory Study of Comparison Income and Individual Debt Using British Household Panel Survey

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The famous saying “keeping up with the Joneses” is a generational behaviour that is still deeply interwoven in the behavioural fabric of our modern-day society. This paper aims to address and contribute to the existing literature by investigating the determinants of individual non-mortgage debt, focusing on the role of comparison income. It also seeks to overcome certain empirical shortcomings by applying Tobit, fixed effects, and Tobit fixed effects regression models to a UK dataset. The study is motivated by previous research, which suggested the aspiration of borrowers is influential in the debt-decision process. Previous studies did not use empirical methods or UK data, however. Comparison income (the measure of the borrowers’ aspiration) is derived from the Mincer earnings equation. Tobit regression is applied in the cross-section analysis and is pertinent considering the censored nature of the dependent variable. In the panel analysis, fixed effects and Tobit fixed effects are used to control for unobserved attributes of sampled individuals that may affect demand for debt. Comparison income and non-mortgage debt as well as other economic and demographic variables are positively and significantly associated. The relationship between comparison income and non-mortgage debt suggests the latter may be incurred for status-maintenance purposes.

Keywords: non-mortgage debt; comparison income; status maintenance; consumer behaviour; Tobit; fixed effects; panel data

JEL Classifications: D12, D14, D19

1 Introduction

Access to credit is beneficial for individuals and for the global economy overall. Individuals can smooth short-term fluctuations in income or invest in long-term projects, such as housing. Concurrently, lending institutions generate profits from the loans granted. While most UK households can repay their debt, a minority of individuals experience problems with debt

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repayment. Drastic welfare losses, such as bankruptcy or housing repossessions, can arise in extreme situations (Gathergood, 2012).

Since the deregulation of the UK financial markets in the late 1990s, UK individuals have had access to an ever-wider range of unsecured debt, such as credit cards, hire loans, quick loans (accompanied by high annual percentage rates, APR) or buy-now-pay-later (BNPL) offers. The widespread access to credit has also been facilitated by building societies, UK and overseas-based finance companies, and even supermarkets (Brown *et al.*, 2005). In addition, the availability of credit at the point of purchase, the advent of telephone, and Internet banking have increased the accessibility of consumer credit and the speed with which loans can be obtained (Brown *et al.*, 2005).

Recent statistics indicate that UK household indebtedness is high and may potentially amplify the risks to economic and financial stability (Bank of England, 2016). In 2016 (first quarter), the aggregate household debt to income ratio was 132%, which is high by historical and international standards (Bank of England, 2016). In the second quarter of 2016, credit-card write-offs (i.e., removal of loans from the asset side of the bank's balance sheet) reached £285 million. Debt is also high at the individual level, such that the total UK personal debt reached £1.496 trillion at the end of July 2016 (approximately £29,631 per adult) (The Money Charity, 2016). Net interest payments of UK households as a percentage of their annual gross disposable income (i.e., the prime determinant of whether a debt is sustainable) were starting to edge up (3.8% in 2014 rising from 3.5% in 2013) due to decline in interests received from UK households (ONS, 2014).

It is paramount for local and national authorities to clearly identify the determinants of debt and assess whether such indebtedness is sustainable. While banks and lending institutions increase their efforts to reduce risks by collecting relevant information on borrowers, certain data remain unidentifiable. For instance, the aspiration level of borrowers, how borrowers compare themselves to their peers, or whether loans are acquired as a status-maintenance mechanism may be dissimulated by borrowers.

Beyond economic costs, debt has also societal costs. Indebted and over-indebted individuals are more depressed and isolated. Debt has also been identified as a major source of severe anxiety and psychological distress (Fitch *et al.*, 2007), which may also affect individuals' labour performance. Moreover, indebted individuals are more likely to experience relationship breakdowns, miss meals, have suffering health, and even consider suicide (CAP, 2011).

There are limited studies on individual demand for debt in the UK. Most of these studies do not focus on the 'human element' in the debt-decision process. Since higher income or education alone is no assurance of loan repayment (Christen and Morgan, 2005), it is important to identify the mechanisms that influence the consumer behaviour in the debt-

decision process. Hence, this paper uses the British Household Panel Survey (BHPS) to explore the determinants of non-mortgage debt at the individual level, focusing on the role of status comparison, such as comparison with respect to income. Waves 1995, 2000, and 2005 of BHPS are the only waves providing information about non-mortgage debt at the individual level. The analysis is time-constrained since Understanding Society 2008–2016 (i.e., the continuation of BHPS) does not provide information on individual non-mortgage debt.

The emphasis on non-mortgage debt in this study is justified by the absence of collateral to obtain it and, as such, is less likely to be accumulated for vital motives as opposed to long-term investments, such as housing. Non-mortgage debts are also relatively faster and easier to obtain relative to mortgage debts. Non-mortgage debts may also reveal new consumption patterns, such that some consumers incur debt as a status-maintenance mechanism. This issue becomes a policy concern since it may affect non-traditional and vulnerable consumers, such as disabled individuals (Citizens Advice Bureau, 2011), students, unemployed or low-income individuals.

In summary, this paper contributes to the literature by investigating the determinants of individual non-mortgage debt, focusing on the role of comparison income. It also seeks to overcome some empirical shortcomings by applying Tobit, fixed effects (FE), and Tobit FE regression models to a UK dataset. The literature review on the determinants of non-mortgage debt is discussed in Section 2. The empirical model is explained in Section 3, while Section 4 lists the data and the variables. Results from the empirical analyses are shown in Section 5. Discussion and conclusions are drawn in Section 6.

2 Literature Review

2.1 Theoretical Explanations for Individual Borrowing

The model of debt for consumers is mainly explained by the life-cycle/permanent-income model (Friedman, 1957; Ando and Modigliani, 1963). It is assumed that consumers choose a path of consumption that maximises their utility over their lifetime, subject to an intertemporal budget constraint. Hence, consumers cannot consume more than the sum of the present discounted value of their income and current net worth (asset holdings minus liabilities). Under this hypothesis, consumers are assumed to behave rationally, and they have perfect information, which guides their lifetime consumption decisions based on an expected lifetime income (Jappelli, 2005). Likewise, under the neoclassical theories, consumers do not base their consumption on current income but on the expected discounted value of future income or permanent income (DeJuan *et al.*, 2006).

Assuming an upward sloping path of income over the working life of consumers, they borrow to finance consumption in the early stage of their work life. As consumers advance in

age and income grows, indebtedness generally decreases. Consumers also use debt (and savings) to smooth consumption over uncertain temporary income fluctuations (Baek and Hong, 2004). In this standard model, indebtedness will depend on demographics, the expected path of future income, and real interest rates. Age is also a key component of the life-cycle hypothesis, and it is assumed that consumers primarily save to accumulate resources that they will use in the future (Baek and Hong, 2004). Savings should be positive for young consumers and negative for those who are retired (Modigliani, 1986; Baek and Hong, 2004,). The implications of the life-cycle model for consumer indebtedness are accentuated when they want to own rather than rent durable goods, especially housing. It requires a much larger amount of debt than that needed to smooth consumption of other goods. This standard model focuses on the demand-side elements of individual borrowing, effectively treating the supply of funds as perfectly elastic at a given interest rate.

In reality, consumers may face liquidity constraints: they are not able to borrow the amount that is optimal according to the standard model (Hall, 1979). Consequently, changes in the structure of the lending markets have a substantial effect in the extent of individual borrowing. Moreover, deregulation of UK financial markets since the 1990s has noticeably eased the existing credit constraints. A significant portion of individual debt growth may reflect a move to a higher equilibrium level where consumers are less constrained by liquidity (Debelle, 2004).

2.2 Determinants of Consumer Debt: Empirical Evidence

The existing but scarce economic literature relating to the economic determinants of non-mortgage debt provides insightful results. Earlier contributions found that the determinants of a household consumer debt were positively and significantly associated with expenditures on durables (Tobin, 1957). An empirical study investigating the demand-side factors influencing the household debt-financing ratio found that it was highly influenced by households' financial optimism, although this was difficult to quantify (Pollin, 1988). Moreover, the decline in real median household income since the 1970s and the concurrent increase in the price of housing also caused household credit demand to increase; thus, households needed additional purchasing power 'in order to sustain a fairly constant living standard' (p. 236). Other contribution (Crook, 2001) indicated that the desired stock of debt increased with the age of the household head, current income (but not when the latter was squared), ownership of the house, family size, employment status, and expected large expenditures in the next few years. Net worth was significant and negatively associated with demand for debt.

2.3 Comparison Income and Demand For Debt

In the literature, little attention has been paid to the role of the ‘human element’ in the mechanisms of demand for debt. Yet, the stimulation of consumerism and wealth accumulation in capitalist societies was already noticed in the late nineteenth century (Veblen, 1899). This research was not empirically tested, however. An analysis of first-time homeowners in France (Bourdieu, 2005) revealed how certain social mechanisms (e.g., advertising of a happy family in their house) could influence households to incur debt, which turned out to be financially burdensome in the long-run. In the US, the increase in subprime mortgage defaults was attributed to the American desire to ‘keep up with the Joneses’ (Martin and Schrum, 2008). Results of the study suggested that the causes of the last 2008 spike in the defaults on subprime mortgage pointed to an imbalance of mortgage debt with the income necessary to pay it off.

Other contributions suggested that the aspiration of borrowers to increase their standard of living could be financially detrimental (Olsen, 2008). This is known as the aspiration paradox, such that the aspiration of borrowers may contribute to a situation in which their borrowings exceed their capacity to repay. A qualitative-based study using poor rural households in India (Morgan and Olsen, 2011) showed that both low- and high-income households had wider access to debt. The rise of debt was made possible via micro-finance initiatives, such as self-help groups (SHG). Other results showed that cow ownership (i.e., a source of prestige) increased among all classes, especially among lower classes. Both status effect and cultural capital seemed to influence the decisions of poor households to accumulate debt. Members of the SHG had the opportunity to associate with higher and forward castes, and this also provided a sense of empowerment for economically and socially deprived women. Albeit a small sample, the study suggested that the reasons to accumulate debt spread beyond the economic sphere. Recent research also found robust social effects on borrowing, especially among households who considered themselves poorer than their peers, and on indebtedness, suggesting a link to financial distress (Georgarakos *et al.*, 2014).

The easy availability of credit in the UK (characterised by a wider range of credit cards, hire loans, quick loans, or BNPL offers, among others) might encourage households to borrow at levels exposing them to subsequent financial difficulties. Whilst most economic and financial literature focuses on the supply-side factors that may have contributed to this tendency, less attention has been focused on the demand-side factors that contribute to the spread of debt culture. This highlights the need for understanding the mechanisms of non-mortgage debt accumulation, especially among individuals valuing comparison income.

This paper contributes to the literature by further exploring the determinants of non-mortgage debt, focusing on the effect of comparison income. The paper also applies empirical methods (Tobit, FE, and Tobit FE) to overcome some of the shortcomings of previous studies.

3 Methodology

3.1 Mincer Earnings Regression and Computation of a Proxy for Comparison Income

Previous studies suggest that individuals compare their income to others in their reference group (Clark and Oswald, 1996; Neumark and Postlewaite, 1998; McBride, 2001; Ferrer-i-Carbonell, 2005; Luttmer, 2005; Clark *et al.*, 2010; Clark and Senik, 2010). Work colleague is the most frequently cited reference group (Clark and Senik, 2010). To derive a measure of comparison income, this study uses the methodology of Clark and Oswald (1996). A proxy for comparison income is derived using Mincer earnings regression. It corresponds to an income prediction for each individual:

$$\ln y_{it} = \alpha_{it} X_{it} + \varepsilon_{it}, i = 1, \dots, N. \quad (1)$$

The natural logarithm of gross earnings for individual i at time t , $\ln y_{it}$, is used instead of its level since it is assumed to be normally distributed. The vector of economic and demographic regressors is X_{it} and α_{it} is the vector of coefficients of these regressors. In addition, ε_{it} represents the vector of stochastic variables. Results of Mincer earnings regressions are displayed (but not discussed) in the appendix (Table A1).

3.2 Empirical Methods for the Demand for Non-Mortgage Debt

The econometric model investigates the determinants of individual demand for non-mortgage debt, with a specific interest for the role of comparison income. Following Crook (2001), the basic model of individual demand for non-mortgage debt d_{it} is related to a vector of explanatory economic, demographic, and financial variables X_{it} . The model also includes comparison income Y_{it}^C as a determinant of non-mortgage debt. The demand for non-mortgage debt purely expresses the arguments of Veblen (1899) and Duesenberry (1949), such that expenditures are guided by durable and non-durable goods beyond consumers' financial means, and by the reluctance of consumers to reduce their consumption, even after a fall in income. This hypothesis may be a plausible explanation of consumer behaviour regarding increasing non-mortgage debt levels to maintain consumption levels despite minimal increases in income (Duesenberry, 1949). The specification is as follows:

$$d_{it} = \beta_0 Y_{it}^C + \beta_1 X_{it} + \varepsilon_{it}. \quad (2)$$

The model is implemented using a Tobit regression on the cross-sectional data since debt cannot be negative and is a censored variable. Ordinary least square (OLS) will not yield

consistent parameter estimates because the censored sample is not representative of the whole sample (Cameron and Trivedi, 2009). Although Tobit model relies on normality, the variable debt is best modelled using its natural logarithm ($\ln d$). It is introduced by specifying (Cameron and Trivedi 2009):

$$d^* = \exp(x_i' \beta + \mu), \mu \sim N(0, \sigma^2). \quad (3)$$

Here, d^* represents the unobserved latent variable, x_i denotes the $K \times 1$ vector of exogenous and fully observed regressors, and β is the coefficients of those regressors. It is then observed that:

$$d_{it} = \begin{cases} d^* & \text{if } \ln d_{it}^* > \gamma \\ 0 & \text{if } \ln d_{it}^* \leq \gamma \end{cases}. \quad (4)$$

Equation (4) simply means that individuals have a latent (unobserved) demand for debt d^* that is not expressed until some known constant threshold, denoted by γ , is reached. Therefore, d^* is only observed when $d^* > \gamma$. The zero amount of debt is then considered a left-censored variable that equals zero when $d^* \leq \gamma$. Using the cross-sectional data of the BHPS, Tobit equations are run for both BHPS and New Earnings Survey (NES) comparison income:

$$\ln d_{it}^* = (\underbrace{Y_{it,BHPS}^c}_{\text{comparison income}}, \underbrace{X_{it}}_{\text{explanatory variables}}, \underbrace{\omega_{it}}_{\text{error term}}), \quad (5)$$

$$\ln d_{i,t}^* = (\underbrace{Y_{it,NES}^c}_{\text{comparison income}}, \underbrace{X_{it}}_{\text{explanatory variables}}, \underbrace{\theta_{it}}_{\text{error term}}). \quad (6)$$

Equations 5 and 6 regress individual non-mortgage debt with BHPS and NES comparison income, respectively, at period t along with the vector of explanatory variables X_{it} . They include economic and demographic variables of individual i at time t , while ω and θ are the disturbance terms for the corresponding equations.

Ancillary FE and Tobit FE (Honoré, 1992) analyses are performed on the pooled data. Tobit FE is consistent when using censored variables and panel data simultaneously (Honoré, 1992). Waves 1995, 2000, and 2005 of the BHPS are merged. The BHPS contains individual identifiers such that observations of the same individuals can be tracked over time. Although the models control for a comprehensive set of debt-related variables, there are potentially unobserved influences on the demand for non-mortgage debt and comparison income, such as attitude towards debt. Despite exploration, as a result of the lack of clearly valid instrumental variables (IV) that are correlated with comparison income but not with non-mortgage debt, an IV procedure could not be applied to examine the issue of endogeneity. Instead, we use FE

and Tobit FE models to consider whether changes in comparison income are related with changes in demand for non-mortgage debt. The Hausman test indicates that the underlying correlation structure favoured the assumptions of the FE compared to a random effects (RE) regression.

4. Data and Variables

4.1 British Household Panel Survey (BHPS)

The data are obtained from the BHPS. This is an annual random sample survey conducted by the Institute for Social and Economic Research (ISER) from 1991 to 2009. It provides a nationally representative sample of more than 5500 private UK households (yielding approximately 10,300 individual interviews).

In 1995, 2000, and 2005, respondents were asked a series of questions relating to their financial commitments, apart from mortgages and housing-related loans. Respondents were specifically asked: 'I would like to ask you now about any other financial commitments you may have apart from mortgages and housing related loans. Do you currently owe any money on the things listed on this card?' This was followed by a series of questions relating to the type of debt. The final question of the series asked respondents: 'How much in total do you owe?' The amount of debt owed relates to non-mortgage debt, and the format of the question clearly suggests respondents would not have included mortgage information in their answer. Details about mortgage debt were asked in a separate question. The answers clearly provide information on the amount of outstanding non-mortgage debt.

Following Clark and Oswald (1996), the regressions exclude those who are younger than 18 years old, retired and unemployed individuals, and the self-employed for a homogeneous sample. Self-employed are also excluded since debt incurred could be work related. This selection is also required since the comparison income proxy is derived from Mincer earnings regressions, implying that only working age population is of interest.

4.2 New Earning Survey (NES)

Ancillary gross earnings are obtained from the NES. This is an annual survey from 1975 to 2015 of earnings of employees in Great Britain conducted by the Inland Revenue. The NES does not provide information relating to mortgage and non-mortgage debt. Its main purpose is to provide information relating to the level, distribution, and make-up of earnings in the UK. Except for the self-employed (and some other exemptions), all those in employment whose national insurance number ends with a two-digit code are included. Information on wages is extracted from the NES to compute another proxy for comparison income. Since comparison

income and explanatory variables are both derived from the BHPS, a significant comparison income in the regression of demand for non-mortgage debt might simply reflect a misspecification. Waves 1995, 2000, and 2005¹ of the NES are used to provide the weekly gross average earnings of those interviewed. To obtain monthly wages, weekly earnings were multiplied by the ratio 52/12. Since NES only provides information on the gender and the industry of those interviewed, the wages generated from the NES were imputed to BHPS sample based on those criteria and the corresponding survey year.

4.3 Variables

Several studies suggest that non-mortgage debt may be accumulated as a status-maintenance mechanism (Martin and Schrum, 2008; Olsen 2008; Morgan and Olsen 2011). In this analysis, comparison income represents the regressor of interest. The regressions also control for standard economic, financial, and demographic variables, including equivalised monthly income, which accounts for differences in household size and composition (Levy *et al.*, 2006). It simply corresponds to the monthly household income divided by the McClements index² (McClements, 1977). The regressions also include gross earnings, value of liquid assets, source of credit, credit-card ownership, financial expectations and burden, and home ownership status. Pay satisfaction is also included since it has been suggested that higher social status and pay satisfaction are inversely correlated (Duesenberry, 1949). Individuals with higher social status, than the one reflected by their income, tend to compete for social status with individuals far above them in income (Duesenberry, 1949). This suggests that individuals unsatisfied with their income (and indirectly with their standard of living) may possibly resort to debt to satisfy a standard of living above their financial means.

Other standard demographic variables are controlled for since previous research found they are associated with individual demand for debt (Canner and Luckett 1990; Dunn and Kim 1999; Crook 2001; Crook 2002). They are as follows: number of children, job tenure, highest educational qualification, age, ethnicity, marital status, and gender. Two time variables are also included in the pooled regressions to account for the effect of interest rates in 1995 and 2000, and national trends that may be associated with non-mortgage debt. (The complete list of the variables used in the regressions are displayed in Table A2 in the appendix).

¹ After 2004, weekly gross earnings are provided by the Annual Survey of Hours and Earnings (ASHE), which is the continuation of NES.

² McClement index is a numeraire which accounts for the different living costs requirements of adults, and children of different age groups (McClements, 1977). McClement index equivalises household income to the reference unit of an adult couple.

5 Results

5.1 Determinants of non-mortgage debt using Tobit, FE, and Tobit FE models

Table 1 displays the Tobit coefficients of the determinants of non-mortgage debt in 1995, 2000, and 2005 respectively, with a particular interest in comparison income (cross-section analysis). Two measures of comparison income derived from BHPS and NES are displayed.

Results for gross earnings and non-mortgage debt are mixed. While gross earnings and debt are negatively associated in 2000, there is a positive and significant association in 1995 and 2000. The change of sign may be attributed to the economic recovery occurring from early 1990s onward and the significant fall in nominal interest rates driving individuals to pay off their debt as earnings were rising. Equivalised monthly income and non-mortgage debt are positively and significantly associated. This is consistent with the literature relating to individual debt (Canner and Luckett, 1990; Drake and Holmes, 1995; Crook, 2001). Although positive, pay satisfaction is not significantly associated with non-mortgage debt.

The central assumption of this paper suggests that the desired stock of debt does not depend only on permanent income but also on comparison income, suggesting that individual demand for debt is positively associated with comparison income. In other words, the higher

Table 1: Results of the Tobit Regressions for the Determinants of Individual Non-Mortgage Debt in 1995, 2000 and 2005 (Cross-Section Analysis)

Dependent variable: Amount of non-mortgage debt owed (log) ; Tobit model						
Regressors	1995		2000		2005	
Gross earnings (log)	0.219*** [0.070]	0.219*** [0.057]	-0.217*** [0.051]	-0.171*** [0.051]	0.294*** [0.075]	0.314*** [0.069]
Comparison income (log)	0.006 [0.091]		0.909*** [0.137]		0.038 [0.094]	
NES comparison income (log)		0.072 [0.504]		1.944*** [0.411]		-0.050 [0.385]
Equivalised monthly income (log)	0.290*** [0.066]	0.289*** [0.066]	0.482*** [0.076]	0.488*** [0.076]	0.144* [0.084]	0.138* [0.084]
Pay-satisfaction	0.026 [0.029]	0.026 [0.029]	0.046 [0.028]	0.045 [0.029]	-0.019 [0.025]	-0.021 [0.025]
Demographic variables (18)	Yes		Yes		Yes	
Financial variables (15)	Yes		Yes		Yes	
Constant	2.274*** [0.634]	1.840 [3.206]	-1.138 [0.946]	-9.415*** [2.783]	5.921*** [0.754]	6.391** [2.597]
Sigma	1.152*** [0.020]	1.152*** [0.020]	1.358*** [0.021]	1.364*** [0.021]	1.255*** [0.023]	1.255*** [0.023]
Observations	2,054	2,054	2,683	2,683	2,718	2,718

Robust standard errors in brackets *** p<0.01, ** p<0.05, * p<0.10

the income of the reference group, the more debt individuals are likely to incur. The results are not validated in 1995 and 2000. The results of comparison income for the year 1995 may be attributed to the inequality gap existing in the mid-to-late 1990s in the UK. A report from the Institute for Fiscal Studies stated that the gains from economic growth at that period were felt more among the very rich rather than the very poor (Institute for Fiscal Studies, 2000). The desire individuals had to increase their standards of living may have been offset by the subjective difficulty in reaching that target even with debt accumulation, partly explaining the non-significance of comparison income. On the other hand, both BHPS and NES comparison income variables have large positive and significant coefficients in 2000. The significance of NES comparison income suggests that the role of BHPS comparison income is not the result of a misspecification. This implies that non-mortgage debt may have been influenced by comparison income, and such demand may be exacerbated as reference income rises

Table 2 presents the results from FE and Tobit FE regression models, respectively, where waves 1995, 2000, and 2005 of the BHPS are merged (panel analysis). Results from these models are important to highlight the differences emerging from using cross-sectional data relative to panel data, where the influence of the sample structure is of major importance.

Table 2: Results of the Tobit, FE and Tobit FE Regressions for the Determinants of Individual Non-Mortgage Debt (Panel Analysis)

Dependent variable: Amount of non-mortgage debt owed (log)						
Pooled sample						
Regressors	Tobit		Fixed effects		Tobit fixed effects	
Gross earnings (log)	-0.057 [0.037]	0.016 [0.034]	-0.255*** [0.064]	-0.208*** [0.064]	-0.254*** [0.064]	-0.208*** [0.064]
Comparison income (log)	0.423*** [0.062]		0.434*** [0.132]		0.433*** [0.131]	
NES comparison income (log)		1.005*** [0.234]		0.811 [0.524]		0.811 [0.523]
Equivalised monthly income (log)	0.366*** [0.044]	0.353*** [0.044]	0.236*** [0.088]	0.235*** [0.089]	0.236*** [0.088]	0.235*** [0.088]
Pay-satisfaction	0.034** [0.017]	0.028* [0.017]	0.015 [0.036]	0.010 [0.036]	0.015 [0.015]	0.010 [0.036]
Demographic variables (18)	Yes		Yes		Yes	
Financial variables (15)	Yes		Yes		Yes	
Year dummies (2)	Yes		Yes		Yes	
Constant	2.833*** [0.452]	-1.915 [1.552]	-2.904 [3.675]	-6.568 [5.057]	--	--
Observations	7,455	7,455	7,455	7,455	7,455	7,455
Sigma	1.291*** [0.013]	1.294*** [0.013]			--	--
R ² within			0.319	0.315	--	--

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.10

Results show evidence of a positive relationship between equivalised income and non-mortgage debt. In contrast, gross earnings are negatively and significantly associated with non-mortgage debt. The significance of gross earnings and equivalised income may reflect a causal relationship. Pay satisfaction and non-mortgage debt are positively and significantly associated. This coefficient ranks individuals from having low to high satisfaction pay levels. The result suggests individuals tend to incur more debt as their pay satisfaction increases, revealing a potential insatiable demand for debt since consumers aspire for higher standard of living (Duesenberry, 1949). The positive relationship between non-mortgage debt and comparison income is more noticeable in the pooled models and suggests that the presence of unobserved characteristics associated with debt and comparison income does not alter this relationship. This result reinforces the theories of Veblen (1899) and Duesenberry (1949) relating to the importance of social comparison in individuals' debt accumulation. It also aligns with the hypothesis of aspiration paradox (Olsen, 2008). The association between comparison income and non-mortgage debt suggests this latter may be accumulated as a status-maintenance mechanism.

5.2 Sensitivity analyses

Sensitivity analyses using pooled data are applied to verify the consistency of the results. First, the marginal effects of the determinants of non-mortgage debt are derived, and results are consistent with the primary Tobit and FE models (Table A3 in the appendix). Results are also consistent in ancillary regressions, which attempt to distinguish the potential collinearity and endogeneity between non-mortgage debt and debt-related variables (Table A4 in the appendix).

The final sensitivity analysis consists of exploring the relationship between comparison income and outstanding mortgage debt. Results from this analysis will further contribute to the claims of Martin and Schrum (2008), who attributed the surge in foreclosure rates to the desire for US households to 'keep up with the Joneses'. FE models are applied to the pooled panel of BHPS (waves 1991–2008). A Hausman test indicated the suitability of the FE regressions ($p = 0.000$) by rejecting the null hypothesis, suggesting RE estimates would not be reliable.

In addition to the comparison income, a household comparison income is computed. It simply corresponds to the ratio of household monthly equivalised income to the household reference income. The household reference income is the average of all incomes of the reference group, whose individuals share the same characteristics (age – by band, academic qualifications, and geographic region). The computation of household comparison income

follows the methods of McBride (2001) and Clark et al. (2010). For individuals with identical age (by band), region, and academic qualifications, the average of household monthly equivalised income is derived; which correspond to the reference groups with which people compare themselves. Household income is strongly associated with the financial ability to request and maintain mortgage payments (Cairns and Pryce, 2005), and it accounts for more financial transfers than the sole earnings.

Results suggest there is no evidence of a significant relationship between comparison income and outstanding mortgage debt. In contrast, there is a positive association between household comparison income and outstanding mortgage debt (Table A5 in the appendix).

6 Discussion and Conclusion

In this paper, the information provided by BHPS is exploited to assess the association between comparison income and non-mortgage debt. Comparison income is derived from a Mincer earnings equation following the literature review.

We find evidence of a positive and significant association between comparison income and non-mortgage debt. The effect is partial in the cross-sectional analysis but is more noticeable in the panel analysis, suggesting that unobservable characteristics do not influence the relationship between non-mortgage debt and comparison income. Other economic and financial parameters are significantly associated with non-mortgage debt in both cross-sectional and panel analyses, such as gross earnings, equivalised monthly income, and pay satisfaction.

The significance of comparison income in the non-mortgage debt model using panel data may suggest this is a causal relationship. Overall, results suggest that a rise in comparison income is associated with more borrowing. Results from the sensitivity analyses also confirmed the positive association between non-mortgage debt and comparison income. These results reinforce the theory of the aspiration paradox (Olsen, 2008). It suggests non-mortgage debt could be accumulated as a status-maintenance mechanism, driven by a desire to 'keep up with the Joneses'. Media and advertisements partly contribute to these behaviours by broadcasting biased lifestyles of the rich and super rich through their acquisition of villas, SUVs, fancy clothes, etc. Luxury, rather than mere comfort, is a widespread aspiration (Schor, 1999). This is also facilitated by the easy availability of credit in the UK via the wider range and access to credit cards and borrowing companies.

The absence of a relationship between outstanding mortgage debt and comparison income in the sensitivity analyses is less surprising, since mortgage debt requires a more thorough examination of the financial stability of the applicants. The absence of a relationship may also

be explained by the nature of the data, such that it was impossible to distinguish prime from subprime-type mortgages. In contrast, there is evidence of a positive and significant association between household comparison income and outstanding non-mortgage debt, suggesting that mortgage debt might be driven by status-maintenance purposes. Further research in the relationship between household comparison income and outstanding mortgage debt (and mortgage arrears) may be beneficial. Such research may be a valuable contribution to understanding the demand-side factors that contributed to the 2008 Global Recession.

High consumer debt levels may be detrimental to the financial stability of a national economy because such debts transfer systematic risks into capital markets (Bernanke and Gertler, 1995; Kerr, 2009). The policy implication of such findings is to hinder, not with the practice of forming social relations, but rather with individuals valuing social comparison and using borrowings as an instrument of status maintenance, especially when this is not supported by the economic fundamentals of the individuals.

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Appendix

Table A1 – Results of Mincer Earnings Equations

Regressors	Monthly gross earnings (log)			Average monthly gross earnings (log)		
	BHPS			NES		
	1995	2000	2005	1995	2000	2005
<i>(Base: Age 18-24)</i>						
Age 25-39	0.356*** [0.023]	0.216*** [0.025]	0.301*** [0.018]	0.099*** [0.012]	0.086*** [0.011]	0.122*** [0.014]
Age 40-59	0.432*** [0.027]	0.198*** [0.029]	0.372*** [0.020]	0.146*** [0.013]	0.108*** [0.012]	0.155*** [0.015]
Age 60-65	0.254*** [0.047]	0.117** [0.057]	0.299*** [0.039]	0.158*** [0.026]	0.090*** [0.023]	0.190*** [0.026]
Age 66+	-0.195* [0.103]	-0.387*** [0.096]	-0.015 [0.073]	0.046 [0.030]	0.080** [0.036]	0.153*** [0.044]
<i>(Base: Female)</i>	0.294***	0.018	0.212***	0.371***	0.316***	0.422***
Male	[0.018]	[0.018]	[0.013]	[0.009]	[0.008]	[0.010]
<i>(Base: Non-white)</i>	0.029	0.010	0.010	0.036	0.015	-0.011
White	[0.044]	[0.053]	[0.038]	[0.024]	[0.026]	[0.028]
<i>(Base: Other marital status)</i>						
Married	0.061*** [0.016]	0.049*** [0.017]	0.075*** [0.012]	0.029*** [0.008]	0.022*** [0.008]	0.040*** [0.009]
<i>(Base: None of these)</i>						
Higher degree	0.752*** [0.057]	0.888*** [0.039]	0.740*** [0.032]	0.383*** [0.021]	0.354*** [0.019]	0.615*** [0.017]
First degree	0.656*** [0.028]	0.690*** [0.030]	0.597*** [0.022]	0.381*** [0.013]	0.297*** [0.013]	0.520*** [0.016]
HND, HNC, Teaching	0.537*** [0.031]	0.545*** [0.033]	0.459*** [0.026]	0.314*** [0.016]	0.206*** [0.015]	0.385*** [0.019]
A level	0.324*** [0.024]	0.334*** [0.027]	0.303*** [0.019]	0.162*** [0.013]	0.122*** [0.011]	0.268*** [0.015]
O level	0.231*** [0.020]	0.106*** [0.027]	0.188*** [0.018]	0.094*** [0.010]	0.072*** [0.010]	0.169*** [0.014]
CSE	0.147*** [0.032]	0.042 [0.040]	0.119*** [0.024]	0.048*** [0.014]	0.021 [0.014]	0.101*** [0.019]
<i>(Base: Banking)</i>						
Agriculture, forestry and fishing	-0.358*** [0.064]	NA	-0.302*** [0.070]	-0.109*** [0.033]	NA	-0.232*** [0.053]
Energy and water supply	0.018 [0.050]	-0.065 [0.062]	0.051 [0.050]	-0.148*** [0.026]	-0.094*** [0.023]	-0.063 [0.047]

Table A1 continued

Regressors	Monthly gross earnings (log)			Average monthly gross earnings (log)		
	BHPS			NES		
	1995	2000	2005	1995	2000	2005
Extraction of mineral	-0.068* [0.037]	0.014 [0.047]	0.297*** [0.078]	-0.099*** [0.021]	-0.062*** [0.021]	0.016 [0.049]
Metal goods, engineering and vehicle	-0.072** [0.028]	-0.041 [0.035]	NA ^s	-0.087*** [0.015]	-0.081*** [0.015]	NA ^s
Other manufacturing	-0.159*** [0.029]	-0.099*** [0.034]	-0.096*** [0.022]	-0.116*** [0.014]	-0.102*** [0.014]	-0.095*** [0.015]
Construction	-0.146*** [0.043]	-0.081* [0.049]	-0.046 [0.029]	-0.064*** [0.023]	-0.061*** [0.018]	-0.096*** [0.019]
Distribution, hotel and catering	-0.312*** [0.027]	-0.217*** [0.029]	-0.293*** [0.021]	-0.062*** [0.013]	-0.071*** [0.012]	-0.050*** [0.015]
Transport and communication	-0.061 [0.040]	-0.020 [0.041]	-0.080*** [0.029]	-0.092*** [0.018]	-0.103*** [0.016]	-0.109*** [0.020]
Other services	-0.132*** [0.024]	-0.071*** [0.025]	-0.109*** [0.019]	-0.010 [0.012]	0.031*** [0.011]	-0.009 [0.013]
(Base: Temporary job)	0.276*** [0.034]	0.157*** [0.042]	0.156*** [0.034]	0.045*** [0.013]	0.062*** [0.014]	0.045** [0.020]
Permanent job	0.730*** [0.042]	0.448*** [0.050]	0.547*** [0.038]	0.032** [0.014]	0.043*** [0.014]	0.026 [0.020]
(Base: Less than 16)	1.392*** [0.042]	0.796*** [0.047]	1.187*** [0.038]	0.112*** [0.014]	0.161*** [0.013]	0.185*** [0.018]
Hours of work: 16-29	1.441*** [0.044]	0.830*** [0.049]	1.285*** [0.039]	0.124*** [0.015]	0.160*** [0.015]	0.181*** [0.020]
Hours of work: 30-39	0.003 [0.003]	0.000 [0.004]	0.007*** [0.002]	-0.004*** [0.001]	-0.003** [0.001]	-0.003** [0.002]
Job tenure	-0.000 [0.000]	0.000 [0.000]	-0.000 [0.000]	0.000** [0.000]	0.000 [0.000]	0.000 [0.000]
Job tenure squared	4.648*** [0.070]	5.687*** [0.084]	5.356*** [0.063]	6.644*** [0.032]	6.881*** [0.034]	6.786*** [0.040]
Constant	4,341	6,308	7,139	4,340	7,240	6,938
Observations	0.673	0.292	0.584	0.546	0.365	0.448
R ²	0.671	0.289	0.582	0.543	0.363	0.446
R ² adjusted						

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

NA: In 2000, there is no observation for 'Agriculture'. The excluded group is 'Banking, finance and insurance'.
 NA^s: In 2005, the industry code applied is the Standard Industrial Classification (SIC) 1992 and no longer Standard Industrial Classification (SIC) 1980, as the one applied in 1995 and 2000. Hence, 'Metal goods, engineering and vehicles' and 'Other manufacturing' are all regrouped in one category 'Manufacturing'

Table A2 – List of Variables Included in the Tobit and FE Equations.

Dependent Variable	Definition
AMOUNT OF DEBT OWED (LOG)	Natural logarithm of amount of non-mortgage debt owed.
Regressors	Definition
Variables of Interest	
MONTHLY GROSS PAY (LOG)	Natural logarithm of gross earnings.
COMPARISON INCOME (LOG)	Natural logarithm of BHPS comparison income. This variable is derived from Mincer earnings equations. The income is then predicted and used as a proxy for comparison income.
NES COMPARISON INCOME (LOG)	Natural logarithm of NES comparison income. This variable is derived from Mincer earnings equations using NES data. The income is then predicted and used as a proxy for comparison income.
MONTHLY EQUIVALISED INCOME (LOG)	Natural logarithm of equivalised monthly income. It accounts for differences in household sizes and composition. It is obtained by dividing annual household income by the McClement index.
PAY SATISFACTION (Z-SCORE)	Standardised value of pay satisfaction. It is obtained by standardising the pay satisfaction variable ranging from 1 (not satisfied at all) to 7 (completely satisfied).
Personal Characteristics	
AGE	Age of the respondent.
AGE SQUARED	Age of the respondent squared.
MARRIED	Dummy variable is equal to 1 for married couple, 0 otherwise.
WHITE	Dummy variable is equal to 1 if head of household is White, 0 otherwise.
MALE	Dummy variable is equal to 1 if head of household is a male, 0 otherwise.
1 CHILD 2 CHILDREN 3 CHILDREN	Dummy variables are equal to 1 if household has 1 child, 2 children, or 3 children respectively, 0 otherwise. No child is the excluded group.
HIGHER DEGREE FIRST DEGREE TEACHING DEGREE A LEVEL O LEVEL CSE	Dummy variables are equal to 1 if head of household's education level is higher degree, first degree, teaching degree, A level diploma, O level diploma, or CSE diploma, respectively, and 0 otherwise. 'None of these' is the excluded group.
Economic Variables	
PERMANENT CONTRACT	Dummy variable is equal to 1 if head of household has a permanent contract, 0 otherwise.
JOB TENURE	Year(s) the head of household has worked with main employer.
JOB TENURE SQUARED	Job tenure squared
HOME OWNER (MORTGAGE)	Dummy variable is equal to 1 if head of household is a homeowner, 0 otherwise.

Table A2 continued

Financial Variables	
FINANCIAL SITUATION 1 FINANCIAL SITUATION 2 FINANCIAL SITUATION 3 FINANCIAL SITUATION 4	Dummy variables are equal to 1 if head of household assess his/her financial situation as 'living comfortably', 'doing all right', 'just about getting by', or 'quite difficult', respectively, or 0 otherwise. 'Very difficult' is the excluded group.
FINANCIAL EXPECTATIONS 1 FINANCIAL EXPECTATIONS 2	Dummy variables are equal to 1 if head of household's financial expectations are 'better than now' or 'worse than now', respectively, or 0 otherwise. 'About the same' is the excluded group.
CREDIT-CARD OWNER	Dummy variable is equal to 1 if household head is a credit-card owner, 0 otherwise.
DEBT: HIRE PURCHASE DEBT: PERSONAL LOAN DEBT: MAIL PURCHASE ORDER	Dummy variables are equal to 1 if head of household's debt type is hire purchase, personal loan, or mail purchase order, respectively, or 0 otherwise. 'Credit-card debt' is the excluded group.
DIVIDENDS: < £100 DIVIDENDS: £100-£499 DIVIDENDS: £500-£999 DIVIDENDS: >= £1000	Dummy variables are equal to 1 if dividends are strictly less than £100, between £100-499, between £500-999, and more than £1000, respectively, or 0 otherwise. 'No dividend' is the excluded group.
Time Variables	
YEAR 1995 and 2000	Dummy variables are equal to 1 if year 1995 or 2000 respectively, 0 otherwise. This variable accounts for the variation of the interest rates in 1995 and 2000, respectively, compared to 2005. They also account for national trends that may be related with non-mortgage debt.

Table A3 – Sensitivity Analyses: Marginal Effects Using Tobit and FE Regressions on Panel Data.
Marginal Effects of Non-Mortgage Debt and Comparison Income Using Tobit Models
(Panel Analysis)

Dependent variable: Amount of non-mortgage debt owed (log)						
Regressors	Marginal effects	Standard errors	z	P> z	95% confidence interval	
Gross earnings (log)	-0.057	0.037	-1.540	0.123	-0.129	0.015
Comparison income (log)	0.423	0.062	6.870	0.000	0.302	0.544
Equivalised monthly income (log)	0.366	0.044	8.250	0.000	0.279	0.453
Pay satisfaction	0.034	0.017	2.060	0.040	0.002	0.067
Regressors	Marginal effects	Standard errors	z	P> z	95% confidence interval	
Gross earnings (log)	0.016	0.034	0.450	0.650	-0.052	0.083
NES comparison income (log)	1.005	0.234	4.290	0.000	0.547	1.464
Equivalised monthly income (log)	0.353	0.044	7.970	0.000	0.266	0.440
Pay satisfaction	0.028	0.017	1.700	0.089	-0.004	0.061

Table A3 continued

Dependent variable: Amount of non-mortgage debt owed (log)						
Regressors	Marginal effects	Standard errors	z	P> z	95% confidence interval	
Gross earnings (log)	-0.255	0.064	-3.95	0.000	-0.381	-0.128
Comparison income (log)	0.434	0.132	3.30	0.001	0.176	0.691
Equivalised monthly income (log)	0.236	0.088	2.67	0.008	0.063	0.409
Pay satisfaction	0.015	0.036	0.41	0.685	-0.056	0.085
Regressors	Marginal effects	Standard errors	z	P> z	95% confidence interval	
Gross earnings (log)	-0.208	0.064	-3.26	0.001	-0.334	-0.083
NES comparison income (log)	0.811	0.524	1.55	0.122	-0.217	1.838
Equivalised monthly income (log)	0.235	0.089	2.64	0.008	0.061	0.409
Pay satisfaction	0.010	0.036	0.28	0.777	-0.061	0.081

Table A4 – Sensitivity Analysis: Role of Endogeneity Between Non-Mortgage Debt and Financial-Related Variables

Dependent variable: Amount of non-mortgage debt owed (log)				
Pooled sample				
Regressors	Tobit		Fixed effects (FE)	
Comparison income (log)	0.580*** [0.059]		0.420*** [0.138]	
NES comparison income (log)		1.808*** [0.246]		0.973* [0.562]
Equivalised monthly income (log)	0.391*** [0.043]	0.428*** [0.042]	0.013 [0.090]	0.037 [0.091]
Pay satisfaction	-0.006 [0.017]	-0.009 [0.018]	0.000 [0.037]	-0.002 [0.037]
Demographic variables (18)	Yes		Yes	
Financial variables (7)	Yes		Yes	
Year dummies (2)	Yes		Yes	
Constant	0.808* [0.454]	-8.408*** [1.630]	-2.654 [3.551]	-7.426 [5.073]
Observations	7,992	7,992	7,992	7,992
Sigma	1.457	1.462	-	-

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

**In Table A4, Tobit and FE regression models are applied. Gross earnings (log) and other financial-related variables (financial situations, financial expectations and type of debt) were removed from the regressions under the basis of potential endogeneity with the dependent variable.

Table A5 – Sensitivity Analysis: Outstanding Mortgage Debt and Household Comparison Income

Dependent variable: Outstanding mortgage debt (log)			
Regressors	Fixed effect (panel)		
Gross earnings (log)	0.019 [0.026]	0.017 [0.024]	0.136*** [0.027]
Comparison income (log)	-0.023 [0.028]		
NES comparison income (log)		-0.138 [0.126]	
Household comparison income (log)			
Equivalised monthly income (log)	0.144*** [0.029]	0.144*** [0.029]	
Demographic variables (14)		Yes	
Mortgage-related variables (4)		Yes	
Observations	10,858	10,858	11,105
Adjusted R ²	0.196	0.196	0.196

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1